

## **Greening the Technology in Teaching and Learning**

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### **Abstract**

Dawning of the digital era has create awareness among researchers to advocate ways to reduce the adverse effects of ICT usage in the country. Though the National Green Technology policy of Malaysia is well fabricated, little is known on how the ICT usage is being monitored and greening the technology is advocated. Studies show that ICT sector contributes to a large amount of carbon dioxide in the atmosphere and finally becomes e-waste due the rate of obsolescence. Nevertheless, ICT infrastructures such as computers puts on an overwhelming pressure on the energy grid. However, greening the ICT can make a significant contribution in reducing carbon dioxide emission and minimize the adverse effects of this technology to the environment. In the Malaysian education system, tremendous actions have been taken to build a more competitive and innovative approach in teaching and learning environment to garner students with digital knowledge for future contribution to the economic development though little is being done in advocating green ICT. Conclusively, this paper will put forward ways to greening the technology used in teaching and learning by teachers.

**Keywords:** Green ICT, Carbon emission, e-waste, ICT in education

### **1. INTRODUCTION**

Information and communication technology (ICT) has been named as an important source of innovation and is the most suitable and widely used domain in the education sector (Wael Sh. Basri et al., 2018). In fact, ICT has been recognized as an important tool which has created opportunities and platforms in acquisition of knowledge (Hilbert and Lopez, 2011). Hence, enormous effort were taken by the Malaysian Education Ministry to integrate technology in teaching and learning process. Meticulous planning was synthesized in an effort to produce digitally advanced manpower according to the vision of the country. Nevertheless, mismanagement of the technology can prompt environmental problems. There is evidence to show that ICT sector is one of the main contributors of e-waste, let alone the detrimental effects of greenhouse gases (GHG) produced by the ICT products. Moreover, it is undeniable that the advancement in this sector puts on an overwhelming pressure on the energy grid Researchers Murugesan (2008), Shadiya Mohamed Saleh Baqutayan, et.al, (2016), Goasduff and Forsling (2007), Weiss (2007), Elliot and Binney (2008), Ruth and Mason (2009), Berthon and Donnellan

(2011), Thongmak (2012) and many more have emphasized the need to green the technology for a sustainable environment.

## **2. THE PARADOX**

Notably, technologies such as computers and notebooks are an important essence of the teaching and learning process since the Malaysian Education Blueprint (2013-2025) was introduced by the Ministry of Education. Usage of technology or ICT is denoted as one of the main component of PAK21 (“Pembelajaran Abad ke-21”). Though some studies show that the usage of technology by teachers is simply to administer the grades and preparing worksheets with minimal tasks (Jones, 2005, Zaki, 2004 and Sulaiman, 2017), the proliferation of technology is expected to escalate to a much larger scale.

However, with studies showing that teachers do not possess the right quality of knowledge to utilize the ICT tools for imparting knowledge, what can be said about the knowledge of sustainability in technology? Raj (2008), Abdullahi Bello et al (2013) and Mosharroff H M and Noreha (2015) unanimously reported that Malaysia is lacking in incorporating green elements in ICT usage. Though there are some consciousness on going green, simple aspects are overlooked and not practiced by users overall. Moreover scanty studies have been done on awareness of green ICT among teachers and sustainable management of the technology in teaching and learning has not been addressed properly (Rabiatul Adawiah and Mohd Shukri (2018).

## **3. GREENING THE TECHNOLOGY IN TEACHING AND LEARNING**

Researches show that there are various ways to implement green ICT. The main motivation in greening the technology in the education sector is to advocate the sustainability ways for adherence by the future generation.

### **1. Reducing energy**

A huge amount of energy can be saved by simply adhering to simple methods such as using energy saver systems or smart energy managements, small monitors. Choosing to leave the computer in sleep mode though can save ample of energy, offing the entire system when not in use is a more effective way of putting less burden on the energy grid.

### **2. Minimizing carbon footprint and e-waste**

ICT equipment's that are being used in the education sector such as laptops and computers are made of hazardous materials such as lead and mercury. Leaving these devices as e-waste in landfills can lead to leachate of these dangerous substances into the soil and waterbodies. Recycling the components of computers is the best solution in avoiding this

disastrous problem. Moreover, investing in green ICT can reduce a huge amount of e-waste in the country.

### **3. Sustenance with regulations**

Continuous monitoring by the government by setting regulations or protocols in usage of ICT by teachers can bring about tremendous change in the attitude of teachers in handling ICT equipment's. Saving the amount of printed papers or worksheets or using minimal printing properties can ensure that the resources are well utilized for better environmental sustenance. Eventually, educating, enforcement and monitoring has shown to have brought awareness among ICT users in developed countries such as United Kingdom, Hong Kong and Japan (Murugesan, 2008)

### **4. Green procurement and procedures**

Advancement in the digital world with the awareness on sustainability of the environment has brought about intelligent innovative or smart devices with hardware's, chips, printers and mobile phones that has special systems to reducing energy usage while performing extra well. Therefore, the government procurements should invest in these infrastructures rather than on systems that are less friendly to the environment.

## **4. CONCLUSION**

This paper intends to put forwards the concepts that can be used in managing ICT infrastructures sustainably to safeguard the environment for the future generation. Considering the lack of awareness among ICT users in the education sector especially, proactive measures should be taken to promote green awareness among teachers. Failing which, a vision of sustainable future will not be accomplished.

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